WHAT IS CLAIMED IS : (U S)

1. A method for manufacturing a field emission display, comprising the step of:

(1a) forming a transparent conductive film on a substrate that is to be a base plate, the transparent conductive film being for forming a cathode electrode;

(2a) applying a photosensitive material on the transparent conductive film;

(3a) exposing the photosensitive material to light, so as to form openings that correspond in a shape of emitters, the light being (a) emitted from a light source, (b) paralleled so that rays thereof have even light intensity distribution, and (c) directed into a micro lens array so as to be condensed in interior of the photosensitive material; and

(4a) forming the emitters respectively in the openings.

2. The method as set forth in Claim 1, wherein:
the photosensitive material is a positive resist.

3. The method as set forth in Claim 1, wherein:
the micro lens array is located between the light

source and the substrate that is transparent, so as to expose the photosensitive material to the light directed thereto from above the substrate.

4. A method for manufacturing a field emission display, comprising the steps of:

(1b) forming, on a substrate to be a base plate, a conductive film from which a cathode electrode is to be formed, and forming, on the conductive film, an emitter formation layer from which emitters are to be formed;

(2b) applying a photosensitive material on the emitter formation layer;

(3b) exposing the photosensitive material to light so as to form pre-emitter shapes that correspond to a shape of the emitters and are to be emitters, the light being (a) emitted from a light source, (b) paralleled so that rays thereof have even light intensity distribution, (c) directed into a micro lens array so as to be condensed in interior of the photosensitive material so that the photosensitive material is given intensity distribution that corresponds to the shape of the emitters;

(4b) performing development so as to remove the photosensitive material and bare the pre-emitter shapes on the emitter formation layer; and

(5) transferring the per-emitter shapes to the emitter

formation layer.

5. The method as set forth in Claim 4, wherein:

the photosensitive material is a negative resist.

6. The method as set forth in Claim 4, wherein:

the transferring of step (5) is carried out by dry etching; and

selection ratio of the emitter formation layer with respect to the photosensitive material in the etching is more than 1.

7. The method as set forth in Claim 4, wherein:

the micro lens array is located between the light source and the substrate that is transparent, so as to expose the photosensitive material to the light directed thereto from above the substrate.

8. The method as set forth in Claim 4, wherein:

the conductive film is a transparent conductive film, and the emitter formation layer is a transparent insulating film,

the method further comprising, after the transferring of step (5):

(6) forming the emitters by depositing a conductive

material onto the pre-emitter shapes formed from the transparent insulating film.

9. The method as set forth in Claim 4, wherein:

both of the conductive film and the emitter formation layer are transparent conductive films; and

the emitters are formed by, in step (5), transferring the pre-emitter shapes to the emitter formation layer formed from the transparent conductive film.

10. The method as set forth in Claim 4, wherein:

the micro lens array is located between the light source and the photosensitive material applied on the substrate, so as to expose the photosensitive material to the light directed thereto from above the photosensitive material.

11. The method as set forth in Claim 10, wherein:

the emitter formation layer is a conductive film; and

in step (5), the pre-emitter shapes are transferred to the conductive film so as to form the emitters.

12. A method of manufacturing a field emission display, comprising the steps of:

(7) (i) forming, on a substrate to be a base plate, a

conductive film from which a cathode electrode is to be formed, (ii) forming, on the conductive film, an emitter formation layer from which emitters are to be formed, and (iii) forming a catalyst layer from which a carbon nanotube is to be formed on the emitter formation layer;

(8) applying a photosensitive material on the catalyst layer;

(9) exposing the photosensitive material to light so as to form pre-emitter shapes that correspond to a shape of the emitters and are to be emitter, the light being (a) emitted from a light source, (b) paralleled so that rays thereof have even light intensity distribution, (c) directed into a micro lens array so as to be condensed in interior of the photosensitive material so that the photosensitive material is given intensity distribution that corresponds to the shape of the emitters;

(10) performing development so as to remove the photosensitive material and bare the pre-emitter shapes on the catalyst layer;

(11) transferring the pre-emitter shapes to the emitter formation layer and the catalyst layer; and

(12) forming the carbon nanotube on the catalyst layer.

13. The method as set forth in Claim 12, wherein:

the emitter formation layer is a conductive film, and the catalyst layer is a metal thin layer; and

in the step (11), the pre-emitter shapes are transferred to the conductive film and the metal thin film, so that peak portions of the emitters are formed from the catalyst layer.

14. The method as set forth in Claim 4, wherein:

the micro lens array has intervals between each of lens portions;

the lens portions condense, in the interior of the photosensitive material, the light emitted from the light source, so as to form the pre-emitter shapes; and

the intervals is a flat portion for letting the light pass therethrough so as to form shapes of the insulating layer.

15. The method as set form in Claim 14, wherein:

the conductive film is a transparent conductive film and the emitter formation layer is a transparent insulating film; and

after the step (5), a conductive material is deposited from above the transparent insulating film, so as to form the emitters and a gate electrode film

16. An apparatus for manufacturing a field emission apparatus, the apparatus being for use in a method for manufacturing the field emission display, the method including:

(1a) forming a transparent conductive film on a substrate that is to be a base plate, the transparent conductive film being for forming a cathode electrode;

(2a) applying a photosensitive material on the transparent conductive film;

(3a) exposing the photosensitive material to light, so as to form openings that correspond in a shape of emitters, the light being (a) emitted from a light source, (b) paralleled so that rays thereof have even light intensity distribution, and (c) directed into a micro lens array so as to be condensed in interior of the photosensitive material; and

(4a) forming the emitters respectively in the openings,

the apparatus comprising:

the light source for emitting the light of wavelengths including a wavelength to which the photosensitive material is sensitive;

a lens for paralleling the light emitted from the light source; and

the micro lens array for condensing the light thus

paralleled by the light source so as to form a plurality of the pre-emitter shapes from the photosensitive material applied on the substrate that is to be the base plate.

17. An apparatus for manufacturing a field emission apparatus, the apparatus being for use in a method for manufacturing the field emission display, the method including:

(1b) forming, on a substrate to be a base plate, a conductive film from which a cathode electrode is to be formed, and forming, on the conductive film, an emitter formation layer from which emitters are to be formed;

(2b) applying a photosensitive material on the emitter formation layer;

(3b) exposing the photosensitive material to light so as to form pre-emitter shapes that correspond to a shape of the emitters and are to be emitters, the light being (a) emitted from a light source, (b) paralleled so that rays thereof have even light intensity distribution, (c) directed into a micro lens array so as to be condensed in interior of the photosensitive material so that the photosensitive material is given intensity distribution that corresponds to a shape of the emitters;

(4b) performing development so as to remove the photosensitive material and bare the pre-emitter

shapes on the emitter formation layer; and

(5) transferring the per-emitter shapes to the emitter formation layer,

the apparatus comprising:

the light source for emitting the light of wavelengths including a wavelength to which the photosensitive material is sensitive;

a lens for paralleling the light emitted from the light source; and

the micro lens array for condensing the light thus paralleled by the light source so as to form a plurality of the pre-emitter shapes from the photosensitive material applied on the substrate that is to be the base plate.

18. An apparatus for manufacturing a field emission apparatus, the apparatus being for use in a method for manufacturing the field emission display, the method including:

(7) (i) forming, on a substrate to be a base plate, a conductive film from which a cathode electrode is to be formed, (ii) forming, on the conductive film, an emitter formation layer from which emitters are to be formed, and (iii) forming a catalyst layer from which a carbon nanotube is to be formed on the emitter formation layer;

(8) applying a photosensitive material on the

catalyst layer;

(9) exposing the photosensitive material to light so as to form pre-emitter shapes that is to be emitter, the light being (a) emitted from a light source, (b) paralleled so that rays thereof have even light intensity distribution, (c) directed into a micro lens array so as to be condensed in interior of the photosensitive material so that the photosensitive material is given intensity distribution that corresponds to a shape of the emitters;

(10) performing development so as to remove the photosensitive material and bare the pre-emitter shapes on the catalyst layer;

(11) transferring the pre-emitter shapes to the emitter formation layer and the catalyst layer; and

(12) forming the carbon nanotube on the catalyst layer,

the apparatus comprising:

the light source for emitting the light of wavelengths including a wavelength to which the photosensitive material is sensitive;

a lens for paralleling the light emitted from the light source; and

the micro lens array for condensing the light thus paralleled by the light source so as to form a plurality of the pre-emitter shapes from the photosensitive material

applied on the substrate that is to be the base plate.